MAINTENANCE/MANAGEMENT PLANNING AND FIELD INVESTIGATION INSTANCES FOR STEEL-CONCRETE COMPOSITE SLABS

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ABSTRACT

In the domain of steel bridges in recent Japan, the technology development represented by the slab of the higher durability and functionality aiming to minimize life cycle cost, or the bridge structure of rationalized forms such as two plate girder bridges and open section box girder bridges is popular. Among others, steel-concrete composite slabs have been employed widely by each authority because they have the characteristics allowing us to reduce the life cycle cost owing to their good workability and high durability, or to prevent concrete from peeling off.

This paper describes a technique for the maintenance/management planning method that the Japan Bridge Association suggests, and presents field investigation instances for the composite slabs which have been under service for not less than about 20 years since their service started.

1. INTRODUCTION

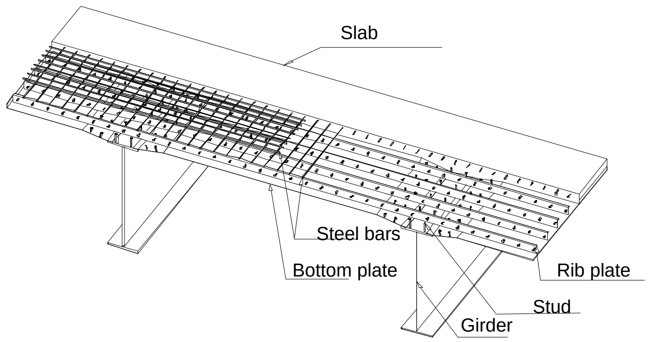

Fig.1 Composite slab

In the domain of steel bridges in recent Japan, the technology development for higher durability and higher functionality aiming to minimize life cycle cost is popular, and the development of bridge structures of rationalized forms represented by such as two plate girder bridges or open section box girder bridges and various technical studies concerning slabs bearing the space function of bridges are performed. Among others, steel-concrete composite slabs (called composite slabs hereafter) are employed extensively by each authority because they have the characteristics allowing us to reduce the life cycle cost owing to their good workability and high durability or to prevent concrete from peeling off.

A composite slab means, as shown in Fig.1, for example, an integrated slab whose bottom steel plate is provided with stiffening members such as cross ribs attached by welding on which steel bars are distributed, and which is concreted to unify them together. Its fatigue durability has been verified so far by wheel load running tests so that it is confirmed that it retains the relative durability not less than that of the exiting conventional slabs in comparison with them[1)].

In order to assure such excellent fatigue durability of the composite slabs, it is important to control properly the quality of steel panels during factory fabricating and in-situ concreting and to clarify a systematized method for the maintenance/management concerning inspection items, judgments on repair/reinforcement and methods for repair/reinforcement. For this reason, composite slabs fabricators conducted verifying tests as a confirmation means of the performance of concrete-filled composite

slabs to establish a working instruction, and clarified the cracking behavior and the damaging mechanism of the slabs through the wheel load running tests under sumilated service conditions, and thereby, suggest a method for the maintenance/management of the composite slabs.

The present paper discloses an arranged method for the maintenance/management planning of the composite slabs based on the knowledge obtained from the research results and executions in great number that have been implemented by each of composite slab fabricators, a member of the Japan Bridge Association, and presents the field investigation instances of composite slabs which have been under service for not less than 20 years since their service started.

2. HISTORY OF COMPOSITE SLABS

The steel slabs combined with concrete have been used since early times and whose technology was employed in the Meiji Bridge (Photo.1) in Usuki city, constructed in 1902 in Oita Prefecture. The design principle of this slab, a structure having the corrugated steel plates filled with concrete for retaining shape, is different from that of the present composite slab. The Robinson's composite slab developed in France in 1950's is the first slab which was positively expected to allow the composite effect between steel and concrete to act. A Japanese original composite slab was developed in 1979 and employed in the Edagawa-ramp bridge, Metropolitan Expressway. Thereafter, domestic steel bridge fabricators in Japan actively have developed the technology for composite slabs, so that they have become employed extensively by each authority since 1996. On the other hand, in the Japan Bridge Association, the unification of slab thickness and slab weight was realized by establishing "JBA Standard Composite Slabs" in 2001, and "Guide to the Design and Execution of Composite Slabs (First edition)" for the use of Association's members was published in the same year, and in 2006, "Planning Manual for Steel-Concrete Composite Slabs (Design examples and commentaries) was published.

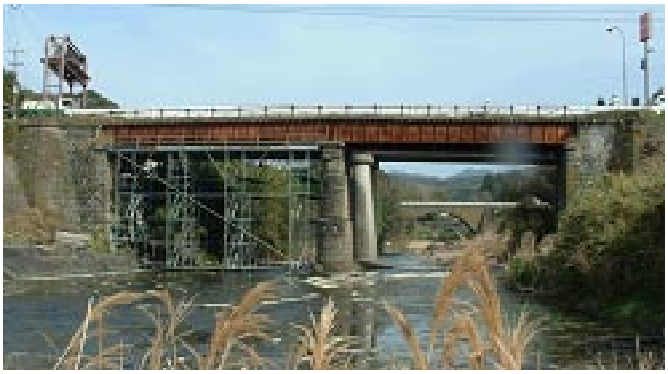

Photo 1. The Meiji Bridge
(One landscape studied by the Japan Society of Civil Engineers)

Furthermore, the studies on the quality control and the maintenance/management including the application of non-destructive testing had been also continued uninterruptedly, "Planning Manual for the Maintenance/management of Steel-Concrete Composite Slabs" was published in 2007, and thus, the effort toward the wide use of composite slabs is yet continuing.

3. PRINCIPLE FOR THE MAINTENANCE/MANAGEMENT OF COMPOSITE SLABS

3.1 SIGNIFICANCE AND PURPOSE OF MAINTENANCE/MANAGEMENT

The life of a structure (a period to the time when the corresponding performance becomes lower than a certain level) depends greatly upon the status of maintenance/management including repair and reinforcement without saying right or wrong of design and construction. The relation between performance level and the in-service period of structure is shown in Fig.2. It is confirmed that a composite slab has high fatigue durability compared with an RC slab from the results of wheel load running tests until now,

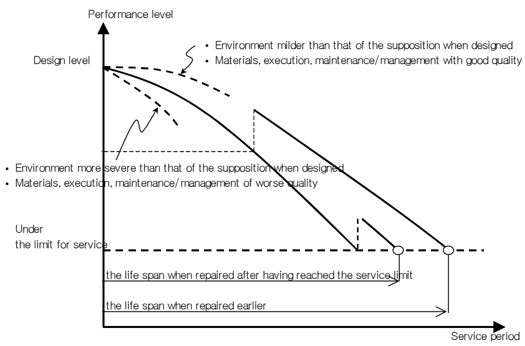

Fig.2 Performance level and life span

however, it is also indicated that the rain water penetrating through a slab from cracks of its concrete portion may accelerate notably to degrade it. In this respect, it can be said that the maintenance/management of composite slabs should be performed properly in order to retain their excellent fatigue durability.

3.2 CONSIDERATIONS FOR DESIGN AND CONSTRUCTION REGARDING MAINTENANCE/ MANAGEMENT

It is hard for composite slabs to drain water completely once it penetrates into them since their bottom faces are covered by the bottom steel plate. For this reason, basically, zinc-rich primer is applied to the face in contact with the concrete on the inner surface of steel plate panels, and when freezing protectant product or snow melting agent is scattered in cold regions, etc., the materials issued from hot-dip galvanizing or polymer cement of thick film and the like are applied to the inner face of steel plate panels. On the other hand, the same coating as that for steel girders or hot-dipped galvanizing, metal spraying or the same specification as that for anti-weathering steel materials is applied to the lower face of bottom steel plate. In addition, concreting joints between the slab concrete and a central island or a wheel guard portion are executed carefully, and counter-measures against water bearing such as the placement of water-proof layers, the arrangement of drainage gradient along vertically crossing direction on the top surface of slabs, the disposition of water conduits as shown in Photo.2 within the pavement are taken into consideration.

Photo 2. Water conduit within a pavement

3.3 PROCEDURE OF MAINTENANCE /MANAGEMENT

In general, maintenance/ management is conducted following a cycle shown in Fig.3. It is important to accumulate the data according to the cycle of maintenance/management like this, for allowing us to realize the enhancement and rationalization of management in coming future. The general procedure of composite slabs with such cycle considered is shown in Fig.4.

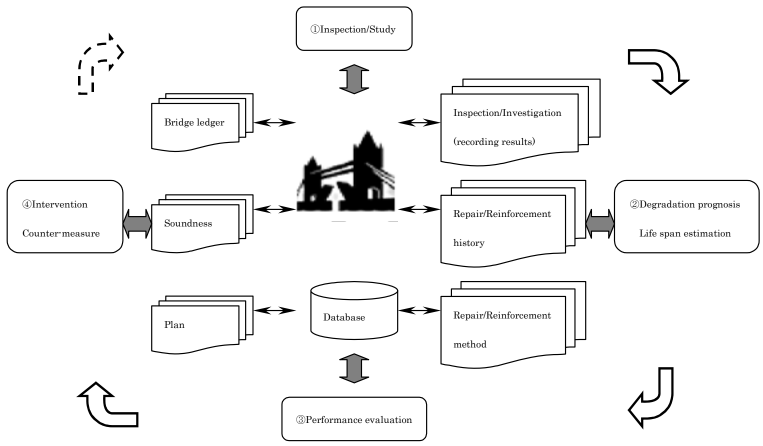

Fig.3 General concept of maintenance/management cycle

3.4 BASIC POLICY OF INSPECTION/INVESTIGATION

Concrete cracks on the lower surface of composite slabs are impossible to be viewed directly due to the bottom steel plate, however, it is known from the results of wheel load running tests that the phenomena occurs according to the progress of fatigue damage as follows.

1) The reduction in the fatigue durability of a composite slab is due to the progress in the fatigue damage of studs (the damage of shear connectors or the concrete damage around them) and the cracked damages inside the concrete, and the rigidity of the slab reduces and the deflection of the slab increases as the fatigue damage evolves.

2) The deflection increasing as the rigidity of the slab reduces allows cracks and potholes on the pavement of the bridge surface to be generated.

3) Cracked pavement and muddy concrete heap up on the top surface when water penetrates into a slab, at the stage where the rigidity of slab does not start reducing.

4) When the cracks passing through the slab concrete are generated, rainwater etc. penetrates into a slab drain from the joints of steel plate panels or monitoring holes.

Accordingly, the basic principles in the maintenance/management of composite slabs are that “whether or not there is either abnormality on the pavement surface or leakage water from the lower face of slabs is inspected intensively” at the stage of the ordinary and the regular inspection, and that “damaged states are evaluated by the deflection of slabs” at the stage of detailed investigation.

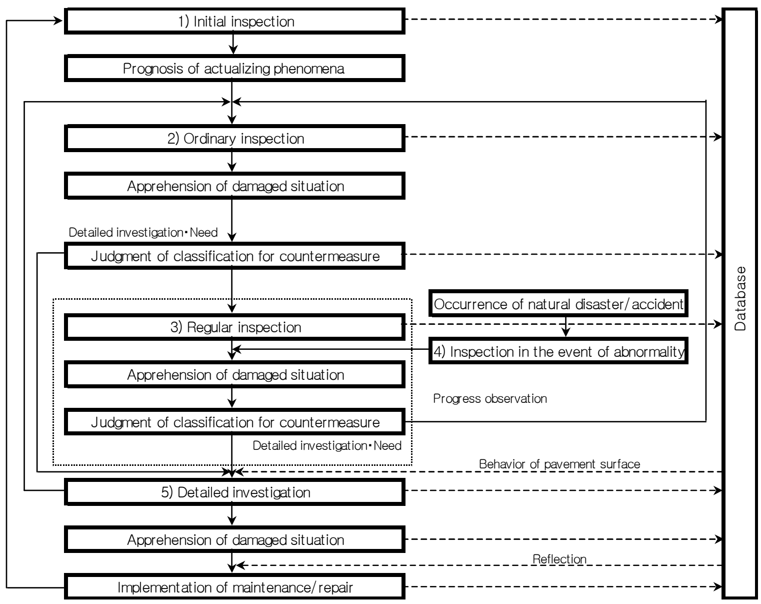

Fig.4 Typical flow of maintenance/management of a composite slab

4. METHOD FOR INSPECTION AND INVESTIGATION

4.1 TYPES AND CONTENTS OF INSPECTION/INVESTIGATION

Generally speaking, as inspections/investigations, there are initial inspection, inspections following the initial inspection (ordinary inspection, regular inspection, inspection in the event of abnormality, and detailed investigation), and a suitable type of inspections is conducted based on the importance and the degradation prognosis of a structure.

(1) Initial inspection

The initial inspection is to investigate whether or not the structure is suitably executed, or repaired/reinforced, and also aim to collect the fundamental data at the beginning of the maintenance/management of the structure. There are the following three types as an initial inspection.

i) The inspection conducted prior to the service of a newly constructed structure

ii) The first inspection for the purpose of maintaining and managing conduct in an existing structure

iii) The inspection performed for the first time where a conducted large-scale countermeasure allows an existing structure to become same as that of a newly constructed one.

(2) Ordinary inspection (Usual inspection)

The ordinary inspection is conducted mainly through visual observation by inspectors targeting early discovery of damages from the ordinary patrols of roads

(3) Regular inspection

The regular inspection is conducted basically by near visual inspection using inspection items and tools as necessary, at a fixed frequency for aiming to grasp the damaged condition and to judge the damaged degree of the structure. Incidentally, as a criterion, each inspection is to be conducted within 2 years for the first time after having come into service and every less than 5 years thereafter.

(4) Inspection in the event of abnormality (Extraordinary inspection)

The inspection in the event of abnormality is conducted aiming to grasp the condition of structures properly and to judge whether a countermeasure is needed or not when the structure is stroke by a natural disaster such as an earthquake and a typhoon, or a fire and a collision due to a car or a ship. Furthermore, there is the emergency inspection as a special one of inspections in the event of abnormality, when an accident due to a change in structural behavior happened, the simultaneous inspections against the structures similar to the structure in which the accident happened are conducted in order to prevent them previously from generating another similar possible accident.

(5) Detailed investigation

The detailed investigation is conducted to obtain the detailed data regarding the degradation and the reduced performance of a structure for the purpose of repair and reinforcement, where it is difficult for the visual inspection to induce the degradation mechanism, to evaluate and judge the degraded condition or the reduced performance, and where the reduced performance due to the degradation is remarkable.

4.2 METHOD OF INVESTIGATION, EXAMINATION AND INSPECTION

The inspection or investigation in the maintenance/management of composite slabs is based on the method by visual observation, and that according to a non-destructive testing and others are to be considered as necessary, where a detailed examination or inspection is conducted such as when any damage or deterioration occurred.

(1) Method by visual observation

The visual observation of the condition on the pavement surface is conducted as a first step of the inspection, since any behavioral change becomes frequently visible when the degradation of concrete proceeds. In addition, it is desirable to verify if there is any leakage water concerning the bottom steel plate face, or not, by visual inspection as shown in Photo.3, and when any behavioral change is noticed, it is preferable to conduct simple measurement in order to evaluate the behavioral change quantitatively by length, area and the like using a tape measure etc. On the other hand, it is preferable to conduct the impact acoustics testing (hammering) using a test hammer as shown in Photo.4 against the swell-up of bottom steel plates or the behavioral change of panel joint bolts to grasp their situation.


Photo 3. Visual observation


Photo 4. Hammering testing

(2) Method according to non-destructive inspection

A test using non-destructive inspection equipment may be conducted when sufficient information can be obtained neither by visual observation nor by impact acoustics testing (hammering) alone. When the test using non-destructive inspection equipment is conducted, it is necessary to clarify the purpose, the applied scope, and the precision needed for measurement to select suitable equipment.

Conventionally, the methods such as the Penetrant Testing (PT), Magnet Particle Testing (MT), and Ultrasonic Testing (UT) for detecting cracks in a steel material are typical, and the measurement method using an ultrasonic thickness meter for the thickness measurement of bottom steel plates is applicable. Furthermore, as the diagnosis of the soundness of concrete structures by non-destructive testing, there are Acoustic Emission (AE) method, ultrasonic method, rebound hardness method, electromagnetic induction method, natural potential measurement method, ultra-red thermography method, etc., any of them is supposed to be applicable. Moreover, from the standpoint of working performance at field sites, the impact acoustics testing method[2)] (Photo.5) analyzing collected sound reflecting from the slab struck by an impulse hammer, and the elastic sweep wave method (Photo.6) performing the frequency analysis of reflected waves excited on the bottom surface of composite slabs by a probe generating the elastic sweep wave of frequency of 9-16 kHz are supposed to be particularly effective.

Photo 5. Impact acoustics testing method

Photo 6. Elastic sweep wave method

(3) Method by locally destructing test

It may be a possible solution to conduct a test destructing locally a part of composite slabs when sufficient information can be obtained by neither the visual observation, the impact acoustics testing, nor the testing using non-destructive testing equipment, as well as when the information with higher precision is needed, and in these cases, positions with no problem in load carrying capacity and durability are to be selected to examine a concrete core or a part of bottom steel plates before cutting out the former or cutting the latter(boring with a core drill).

5. EVALUATION AND JUDGEMENT

5.1 EVALUATION OF DAMEGED DEGREE

Among the evaluation methods of damaged degree, there is the one evaluating with qualitative classification, the one evaluating with quantitative classification accompanying numerical value data, and the other one evaluating with the both classifications, according to the type of damages. There also is an evaluation according to the deflection of slabs as a method evaluating the soundness of composite slabs quantitatively. According to a survey study among the composite slab fabricators, live load deflections with the section stiffness property (design performance) secured by neglecting the tension side concrete

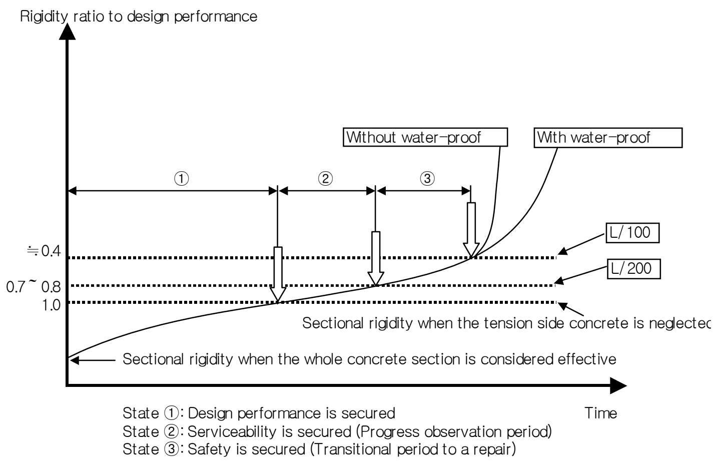

Fig.5 The concept of deflection changes in composite slabs

are in the order of L/2000 to the span length L of a slab, and live load deflections according the section stiffness property with separated double layers due to the generation of horizontal cracks are in the degree of L/1000, and thereby, the damaged degree can be evaluated by the results of an actual measurement and the concept shown in Fig.5.

5.2 JUDGMENT OF CLASSIFICATION FOR COUNTERMEASURE

The judgment of classification for countermeasure based on the evaluation of damaged degrees needs to be performed by taking into account of the reduced performance level and the classification of maintenance/management of composite slabs. The interval, the width, and the density of cracks based on their observation are set as standard items in judging the damaged degree of existing slabs by each road management authority. In addition, situations such as the leakage water, the permeation and the deposition of efflorescence from the slab's lower surface are also partly taken into consideration separately. As for the classification for countermeasures of composite slabs, a judging method (Table 1) is suggested, associating the abnormalities on pavement surfaces with the leakage water from slabs as well as thinking of the security of transporting function and the influentiality on travelling vehicles, referring to the classification for countermeasure shown in the "Regular Inspection Procedure for Bridge (Draft) of Ministry of Land Infrastructure and Transport of Japan". This judging method has extremely low possibility allowing a composite slab to reduce load carrying capacity rapidly, and therefore, conducting the detailed investigation based on such classified judgment allows us to judge whether the repair or the reinforcement is needed or not.

Table 1. An example of classification for countermeasure in composite slabs

[Protruded portion of slabs]

Sort of damage		Abnormalities on the pavement surface					
Leakage water from the lower surfac of slabs	Damaged degree	No abnormalities	Occurred potholes	Occurred swell-ups	Occurred regular potholes	Occurred regular swell-ups	Occurred Meshy cracks
	No leakage water	◎	□	□	▲	▲	▲
	Existence of leakage water	▲	▲	▲	▲	▲	▲
	Existence of separated lime	▲	▲	▲	▲	▲	▲
	Existence of rust fluid	▲	×	×	×	×	×

[Roadway]

Sort of damage		Abnormalities on the pavement surface					
Leakage water from the lower surfac of slabs	Damaged degree	No abnormalities	Occurred potholes	Occurred swell-ups	Occurred regular potholes	Occurred regular swell-ups	Occurred Meshy cracks
	No leakage water	◎	□	□	▲	▲	▲
	Existence of leakage water	×	×	×	×	×	×
	Existence of separated lime	×	×	×	×	×	×
	Existence of rust fluid	×	×	×	×	×	×

[◎ :Recording, □ :Preserving the function of pavement, ▲ :Follow-up investigation, × :Detailed investigation]

6. REPAIRING METHOD OF COMPOSITE SLABS

(1) Repair of cracks

Crack repairing or water stopping should be implemented against light cracks and the leakage water without rust fluid. The injection method and others may cope with the case of cracks over 0.2mm in width.

(2) Partial re-concreting

The damaged portion should be replaced partially by re-concreting after chipping and removing it from the top surface of slabs, when slab rigidity is reduced due to remarkable cracks. Repairing work is

performed in order of i) Preparing work, ii) Removal of pavement and damaged concrete portion, iii) Concreting and curing, iv) Execution of water proof layer and pavement. There are methods using such as a breaker, a water jet and the like, as concrete chipping methods.

7. FIELD INVESTIGATION INSTANCES OF COMPOSITE SLABS

The two instances of field investigations that were performed according to the previously mentioned method of investigation and inspection, on the composite slabs which have been under service approximately not less than 20 years since the service started, are shown in the followings.

7.1 INSTANCE-1
(Edagawa-ramp: the composite slabs under service in a heavily trafficked highway)[3)]

(1) Outline of bridge

The bridge presented in the instance-1 is a simple composite plate girder bridge at the Edagawa- ramp exit, in Fukagawa route, Metropolitan Expressway No.9 (Koutou-ku Tokyo). The Edagawa-ramp consists of one simple composite box girder, 3-span continuous steel box girder, 3 simple composite plate girders and the composite slabs are applied to the 3 simple composite plate girders in linear portion. Bridge factors are as follows, bridge rank; first class bridge (TL-20), bridge length; 28m, span length; 27.3m, gross width; 5.95m, effective width; 4.75m, slab span; 2.1m, asphalt pavement; 8cm, and slab thickness; 15.6cm. The outline view of the bridge is shown in Fig.6. Design criteria are in accordance with the Road Bridge Specification (the Japan Road Association, 1973) and the Steel Structure Design Standard (the Metropolitan Expressway Public Corporation of Japan). The composite slabs are of a composite slab with steel form as shown in Fig.7, a structure allowing steel to combine with concrete by means of studs etc. and thereby aiming advantages such as losing slab dead load, shortening site construction period, enhancing safety, avoiding falling of concrete flaks, and the like. The R&D of such form was started from 1974 during the time of the Metropolitan Expressway Public Corporation and applied actually to the bridge at the Edagawa-ramp in 1980. There is no great difference between the composite slab of Edagawa-ramp and the current one regarding the materials (concrete, steel bars, bottom steel plates) and the slab structure (slab thickness, joint structure, water-proof layer) and the like. This ramp has been under service since February 1980, and a coating repair work was performed under the supervision of the Metropolitan Expressway Public Corporation in 1989. In addition, 27 years have passed since its opening at the time of field investigation in October 2007.

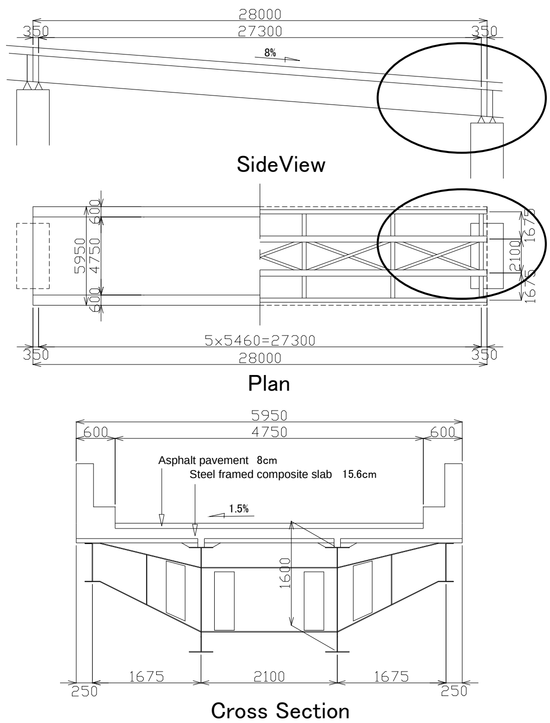

Fig.6 Outline view of the bridge

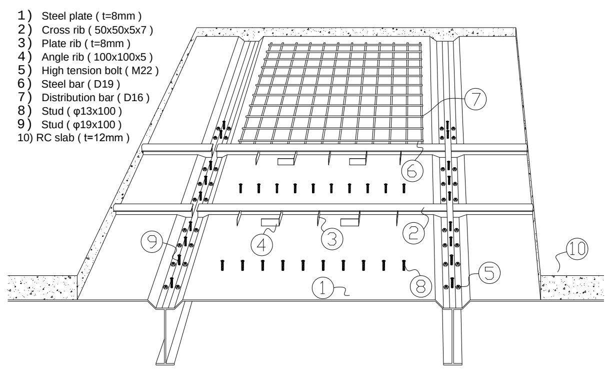

Fig.7 The composite slab of the Edagawa-ramp

(2) Outline of investigation

Targeted locations for the investigation in the present bridge are shown in Fig.6 marked by circles. The targeted positions for investigation were focused on the points where there were many damaged cases in the RC slabs and water tended to accumulate inside the composite slabs, investigated and inspected by the methods of i) visual observation, ii) method by hammering, iii) impact acoustics method, iV) elastic sweep wave method, v) ultrasonic wave method[4].

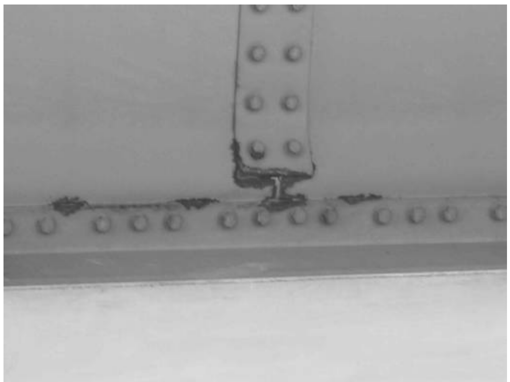

Photo 7. Corrosion around splice-joints

i) Visual observation

There were no harmful deformations and damages in the composite slabs of Edagawa-ramp. Rusting in part around the joints between the main girder upper flanges and the slab bottom steel plates, and the high tension bolt splicing plates of slab connections was noticed, but no plate-thickness loss in steel plate occurred (Photo 7).

ii) Method by hammering

The points where strange noise occurred when the bottom steel plate was hammered by a test hammer from the lower surface of the slabs are shown in Fig.8. The majority parts of the investigated points did not generate any strange noises so that it was induced that there was almost no detachment between the bottom steel plate and the concrete. Even the points at which some strange noises were detected were limited to the thickened haunch parts of the slabs, the joints between the main girder and the slab, and the portion in the vicinity of the slab's ribs, of which ranges were also limited within the diameter of a circle, of about 20 cm.

iii) Non-destructive testing

The summary of the investigation results according to the impact acoustics method, the elastic sweep wave method, and the ultrasonic method are shown in Table 2.

The criterion for each judgment of investigation results is based on the results of the sample testing simulating each defect. Any of the testing methods resulted in almost the same. The left side protruding portion (L1, L10) having different induced results are assumed to be caused by the fact that the points at which were contact with the probe of the non-destructive testing could be deviated a little since the area where the strange noise occurred was a little larger.

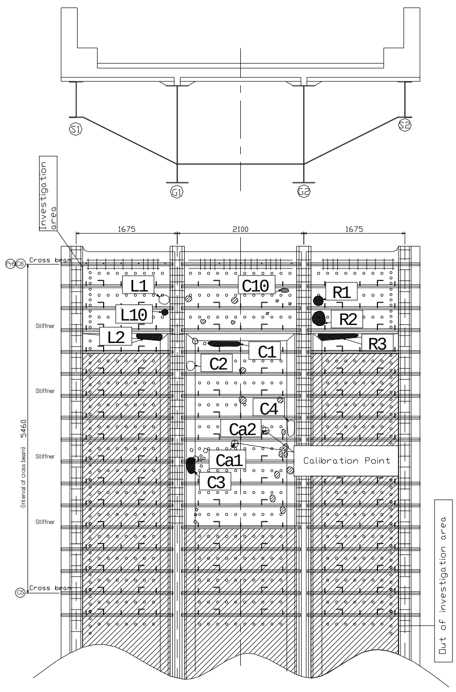

Fig.8 Occurring positions of strange noise

Table 2. Results induced by each investigating method

Investigated Position		Impact acoustics method	Elastic sweep wave method	Ultrasonic wave method
Left-side	L1	Moisuture	Detachment/Moisture	-
	L2	Detachment	Good	-
	L10	Moisuture	Detachment/Moisture	-
Center-span	C1	Detachment	Good	-
	C2	Detachment	Detachment	Detachment
	C3	Detachment	Detachment	Detachment
	C4	Detachment	Detachment	Detachment
	Ca1*	Good	Good	Good
	Ca2*	Good	Good	Good
	C10	Detachment/Moisture	Detachment/Moisture	-
Right-side	R1	Detachment/Moisture	Good	-
	R2	Detachment/Moisture	Good	-
	R3	Detachment	Good**	-

*: Ca1 and Ca2 are the good condition by testing through hammering.

**: A wave-form indicating detachment between concrete and steel plate appears depending on the measuring position.

(3) Summary of the instance-1

The composite slabs of the Edagawa-ramp almost similar to that of the current standard were investigated in the field, so that it was verified that even having been under service for 27 years since their service started, they had no conspicuous damage or corrosion and maintained the very well condition. Furthermore, it has turned out that the three kinds of non-destructive methods employed in the investigation of the present bridge have an interrelationship among them, and therefore, are highly reliable.

7.2 INSTANCE-2 (Reiyou-bridge: the composite slabs under service in a coastal road)

(1) Outline of bridge

The bridge presented in the instance-2 is a plate girder bridge in Amakusa. This bridge is a simple span steel plate girder with the composite slabs. Bridge factors are as follows, bridge rank; first class bridge (TL-20), bridge length; 35m, span length; 34.1m, gross width; 13.8m, effective width; 13.0m, slab span; 3.8m, asphalt pavement; 7cm, and slab thickness; 16.0cm. The outline view of the bridge is shown in Fig.9. Design criterion was in accordance with the Road Bridge Specification (the Japan Road Association, 1980). The composite slabs are of a composite slab with steel form as shown in Fig.10, a structure allowing steel to combine with concrete by means of truss shaped dowel plates. There is no great difference between the composite slab of Reiyou-bridge and the current one regarding the materials (concrete, steel bars, bottom steel plates) and the slab structure (slab thickness, joint structure, water-proof layer) and the like. This bridge has been under service since May 1990, and a coating repair work was performed in 2002. In addition, 18 years have passed since its opening at the time of field investigation in October 2008.

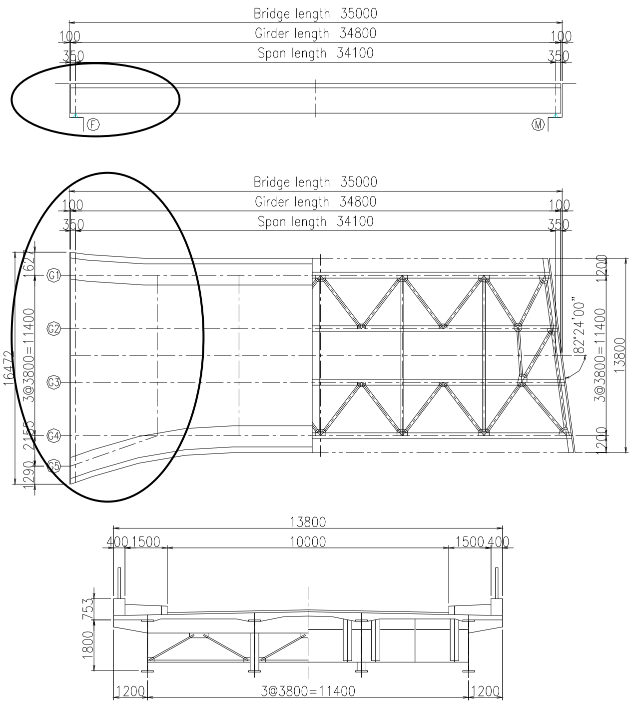

Fig.9 Outline view of the bridge

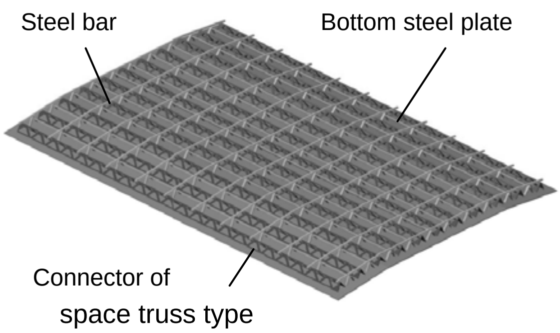

Fig.10 Composite slab panel of the Raiyou-Bridge

Photo 8 Aspect of around a drainage box

(2) Outline of investigation

Targeted locations for the investigation in the present bridge are shown in Fig.9 marked by circles. The targeted positions for investigation were focused on the points where there were many damaged

cases in the RC slabs and water tended to accumulate inside the composite slabs, investigated and inspected by the methods of i) visual observation, ii) method by hammering, iii) impact acoustics method, iV) elastic sweep wave method.

i) Visual observation

There were no harmful deformations and damages in the composite slabs of Reiyou-bridge. Rust had been generated in a very little part. But there were no rust around drain or joint with possibility of water leak (Photo.8).

ii) Method by hammering

The points where strange noise occurred when the bottom steel plate was hammered by a test hammer from the lower surface of the slabs are shown in Fig.11. The majority parts of the investigated points did not generate any strange noises so that it was induced that there was almost no detachment between the bottom steel plate and the concrete. Even the points at which some strange noises were detected were limited to the steel bending points.

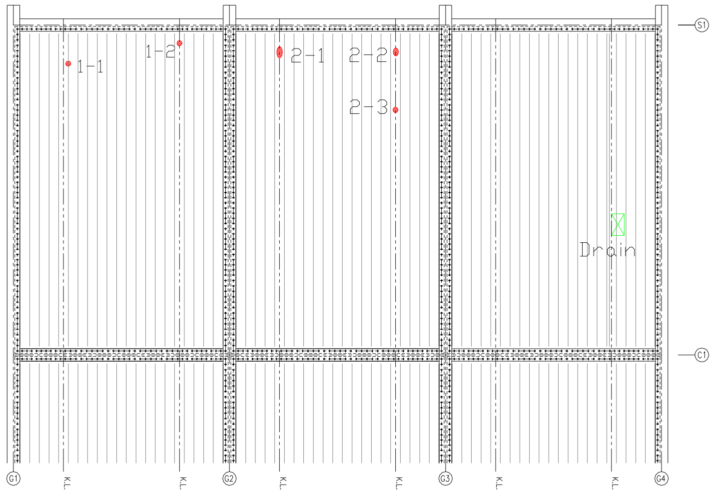

Fig. 11 Points with occurred strange noises

Table 3 Induced results by each investigating method

Investigated Position		Impact acoustics method	Elastic sweep wave method
G1-G2	1-1	Detachment/Moisture	Moisuture
	1-2	Detachment/Moisture	Moisuture
G2-G3	2-1	Detachment/Moisture	Moisuture
	2-2	Detachment/Moisture	Moisuture
	2-3	Detachment/Moisture	Moisuture

iii) Non-destructive testing

The summary of the investigation results according to the impact acoustics method, the elastic sweep wave method are shown in Table 3. Two testing methods became a same result. And they indicated the possibility of detachment between bottom steel plate and concrete in a very little parts.

(3) Summary of the instance-2

The composite slabs of the Reiyou-bridge almost similar to that of the current standard were investigated in the field, so that it was verified that even having been under service for 18 years since their service started, they had no conspicuous damage or corrosion and maintained the very well condition. Furthermore, it has turned out that the two kinds of non-destructive methods employed in the investigation of the present bridge have an interrelationship among them, and therefore, are highly reliable.

8. CONCLUSIONS

The present paper describes the maintenance/management planning method of steel-concrete composite slabs that the Japan Bridge Association suggests, and reports the results of the field investigations on the composite slabs which have been under service for not less than about 20 years since their service started. It was verified that the maintenance/management planning method that the Japan Bridge Association advocated was practical to induce the actual situation of a composite slab efficiently.

At the same time, in addition, it has turned out that performing an appropriate maintenance/management of composite slabs allows us to maintain it in the good state even though not less than about 20 years have passed since their service started.

It is still intended that, hereafter, the investigations on actual composite slabs are continued to accumulate the durability data on composite slabs in various service conditions and thereby, the further adaptation of the investigation and inspection method will be performed.

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